# TABLE OF CONTENTS

LARGE HIGH PRESSURE CENTRIFUGAL COMPRESSORS FOR OXYGEN SERVICE .......................................................... 1
*Kenneth W. Geiser, Manager, Compression Equipment Division, American Demag Corporation, New York, New York*

DISTORTION OF SPEED CHANGER HOUSINGS AND RESULTING GEAR FAILURES .................................................. 7
*Fred L. VanLaningham, Senior Staff Engineer, Systems and Machinery Management, Union Carbide Corporation, Chemicals & Plastics, South Charleston, West Virginia*

INSTALLATION OF LARGE ROTATING EQUIPMENT SYSTEMS — A CONTRACTOR’S COMMENTS ........................................... 15
*Dr. John R. Massey, Senior Consultant, Mechanical Engineering, McDermott Hudson Engineering, Houston, Texas*

SITE BALANCING OF A LARGE FLEXIBLE ROTOR CONTAINING UNBALANCE ECCENTRICITY AND PERMANENT RESIDUAL BOW ................................................................. 23
*A. S. Maxwell, Maintenance Specialist, Balancing and Vibration; A. F. P. Sanderson, Maintenance Engineer, Mechanical System Maintenance Division, Ontario Hydro, Toronto, Ontario, Canada*

ADVANCED RESEARCH PROGRAMS IN TURBOMACHINERY ...................................................................................... 31
*Dr. Meherwan P. Boyce, Director; William L. Trevillion, Graduate Research Assistant; Michael L. Brown, Graduate Research Assistant; Gas Turbine Laboratories, Texas A&M University, College Station, Texas*

PROBLEMS ENCOUNTERED IN BOILER FEED PUMP OPERATION ........................................................................... 45
*Dr. Elemer Makay, Technical Director, Energy Research & Consultants Corporation, Morrisville, Pennsylvania*

PULSATIONS IN LIQUID PUMPS AND PIPING SYSTEMS ......................................................................................... 55
*Cecil R. Sparks, Director, Engineering Physics; J. C. Wachel, Manager, Applied Mechanics; Applied Physics Division, Southwest Research Institute, San Antonio, Texas*

TURBOMACHINERY NOISE RATING ......................................................................................................................... 63
*George M. Diehl, Manager, Sound & Vibration Section, Ingersoll-Rand Company, Phillipsburg, New Jersey*

RELIABLE OVERSPEED PROTECTION FOR INDUSTRIAL DRIVE TURBINES ......................................................... 71
*Firm L. Weaver, Manager of Engineering, DeLaval Turbine Inc., Trenton, New Jersey*

INDUSTRIAL STEAM TURBINES IMPROVE ENERGY UTILIZATION IN THERMAL POWER PLANTS ........................... 79
*R. Wickl, General Technical Manager, Siemens Corporation, Wesel, Federal Republic of Germany*

EFFICIENCY IN MECHANICAL DRIVE STEAM TURBINES ..................................................................................... 87
*John A. Brown, Manager, Advanced Engineering, Steam Turbine Division, Turbodyne Corporation, Wellsville, New York*

PRACTICAL DESIGN SOLUTIONS FOR MECHANICAL DRIVE STEAM TURBINES .............................................. 99
*Alfred M. Spechtenhauser, Manager, Calculation Department, Brown Boveri Corporation, Baden, Switzerland*

COUPLING MISALIGNMENT FORCES .................................................................................................................. 111
*C. B. Gibbons, Project Engineer, Electrical & Fluid Power Division, The Bendix Corporation, Utica, New York*

METAL DIAPHRAGM COUPLING PERFORMANCE ................................................................................................. 117
*M. M. Calistrat, Manager, Power Transmission Development Section, Research & Development Department, Metal Products Division, Koppers Company, Inc., Baltimore, Maryland*

AXIAL VIBRATION CHARACTERISTICS OF METAL-FLEXING COUPLINGS ............................................................ 125
*Fred K. Landon, Manager, Coupling Division, Rexnord Inc., Warren, Pennsylvania; Louis F. Counter, Senior Research Manager, Corporate R&D Group, Rexnord Inc., Milwaukee, Wisconsin*
TUTORIUMS:

BALANCING OF MULTIMASS FLEXIBLE ROTORS ............................................ 133
Dr. E. J. Gunter, Professor of Mechanical Engineering; L. E. Barrett, Senior Research Engineer;
Dr. P. E. Allaire, Assistant Professor of Mechanical Engineering; University of Virginia,
Charlottesville, Virginia

FIELD TESTING OF COMPRESSORS ......................................................... 149
Dr. Meherwan P. Boyce, Director, Gas Turbine Laboratories, Texas A&M University; Richard D.
Bayley, Technical Services Superintendent, Columbia Gulf Transmission Company, Houston, Texas;
Vankayalapati Sudhakar, Graduate Research Assistant, Gas Turbine Laboratories; Vijayvardhan
Elchuri, Graduate Research Assistant, Gas Turbine Laboratories; Texas A&M University,
College Station, Texas

DISCUSSION LEADERS ........................................................................ 161

ADVISORY COMMITTEE ........................................................................ 167

EXHIBITORS ......................................................................................... 171

GAS TURBINE LABORATORIES .............................................................. 177

PROFESSIONAL PERSONNEL ................................................................. 180